

IN THE DRAWINGS

The attached sheets of drawings include changes to Figs. 27A-C and 28A-C. These sheets, which include Figs. 27A-C and 28A-C, replace the original sheets including Figs. 27A-C and 28A-C.

Attachment: Replacement Sheets

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the following discussion, is respectfully requested.

Claims 1-70 are pending, of which Claims 1-17, 63, and 67 are active; and no claims are amended, newly added, or canceled herewith.

In the outstanding Office Action, Figures 27A-C and 28A-C were objected to as including informalities; Claims 1-7, 9-13, 63, and 67 were rejected under 35 U.S.C. § 103(a) as unpatentable over Okada et al. (U.S. Pat. No. 6,226,086, herein Okada) in view of admitted prior art; Claims 8, 14, 16, and 17 were rejected under 35 U.S.C. § 103(a) as unpatentable over Okada in view of admitted prior art and in further view of Kondo et al. (U.S. Pat. No. 5,731,849, hereafter Kondo); and Claim 15 was rejected under 35 U.S.C. § 103(a) as unpatentable over Okada and admitted prior art in view of Onuki (U.S. Patent Publication No. 2002/0097324).

At the outset, Applicants thank Examiner Ye for the interview granted Applicants' representative on March 21, 2006. During the interview, the pending claims were discussed with regard to Okada. As discussed during the interview, the outstanding rejection of Claims 1-7, 9-13, 63, and 67 is respectfully traversed.

In response to the objection to Figures 27A-C and 28A-C as including informalities, Figures 27A-C and 28A-C have been amended to include the moniker "prior art". Accordingly, Applicants respectfully request the objection to the drawings be withdrawn.

In the past, pixel shift photography has been used to improve solid state image sensing device quality. Pixel shift photography obtains high resolution by combining an image photographed by shifting a subject by half a pixel pitch and an image before such shifting to obtain a single image. Typical examples of image shift mechanisms are shown in Figures 27A-27C of the present specification.

However, using conventional image shift techniques, desired image quality may not be obtained. Namely, due to the movement of a user's hands, movement of the subject, or change in performance of the pixel shift mechanism, image quality may be deteriorated. When any of these events occurs, the degree of deterioration of the image differs depending on the degree of the shift. In fact, if deterioration of the image crosses a certain threshold, the image becomes inferior as compared to an image obtained using ordinary photography techniques.¹

In light of these difficulties, the Applicants developed the present invention, as recited, for example, in Claim 1. To this end, Claim 1 recites, in part,

a judgment unit which judges whether the pixel shift photography has been normally performed or not, based on the image data for a plurality of images output before and after the displacement of said image sensing unit.

Independent Claims 63 and 67 recite analogous features.

In the outstanding Office Action and in the interview, Figures 12 and 13 and the corresponding description at col. 14, line 49 to col. 16, line 53, of Okada, were cited as describing the judgment unit of Claim 1. However, the description in Okada is very different from the judgment unit recited in Claim 1.

In Okada, a moving amount detecting unit 9 uses image data A stored in image memory 31 and later obtained image data B stored in image memory 32 to calculate a motion vector.² This motion vector is used estimate movement of the device.³ However, when the motion vector calculator operation rate is slow the moving amount cannot be calculated in real time⁴, thus, the motion vector and the moving amount are calculated using historical moving amounts.⁵

¹ Specification, pages 2-3.

² Okada, col. 14, lines 51-55.

³ Okada, col. 14, lines 55-57.

⁴ Okada, col. 15, lines 14-16.

⁵ Okada, col. 15, lines 16-19.

Once the moving amount (dx, dy) is calculated, the moving amount detecting unit 9 sends the value to the judging circuit 10.⁶ The judging circuit then determines if the moving amount (dx, dy) is larger than 1/10 of the pixel pitch (Px, Pr).⁷ If moving amount (dx, dy) is larger than 1/10 of the pixel pitch (Px, Pr), the image shift amount (Xr, Yr) is set to 0, and the image shifting mechanisms 3 and 4 do not move.⁸ Thus, the single image that is currently on the image element 5 is sent unmodified to the image synthesizing circuit for interpolation (or resizing⁹).¹⁰ Once this processing is complete the image is saved.

Alternatively, if the judging circuit determines that the moving amount (dx, dy) is not larger than 1/10 of the pixel pitch (Px, Pr), the judging circuit sets the shift amount to $Xr=1/2Px$ and $Yr=1/2Py$.¹¹ The image currently on the image element 5 is saved. Then the control circuit 8 then shifts the image shifting mechanisms 3 and 4 the shift amount $Xr=1/2Px$ and $Yr=1/2Py$.¹² Once this is accomplished, the shifted image on the image element 5 is saved. Finally, the two images are then sent to the image synthesizing circuit 6 where they are combined into one image.¹³

As can be seen from the above description, the judging circuit of Okada and the judgment unit of Claim 1 are completely different. They have different purposes and judge completely different things. The judging circuit of Okada 10 judges if a camera moving amount (dx, dy) is larger than a predetermined threshold, while the judgment unit of Claim 1 judges if the pixel shift on the actual completed merged image has been performed correctly or not.

⁶ Okada, col. 15, lines 42-44.

⁷ Okada, col. 15, lines 50-52.

⁸ Okada, col. 15, lines 52-57.

⁹ One skilled in the art would recognize interpolation as the process by which an image is resized.

¹⁰ Okada, col. 15, lines 60-65.

¹¹ Okada, col. 15, line 66 to col. 16, line 3.

¹² Okada, col. 16, line 3.

¹³ Okada, col. 16, lines 4-9.

Therefore, Okada does not describe or suggest "a judgment unit which judges whether the pixel shift photography has been normally performed or not, based on the image data for a plurality of images output before and after the displacement of said image sensing unit," as is recited in Claim 1.

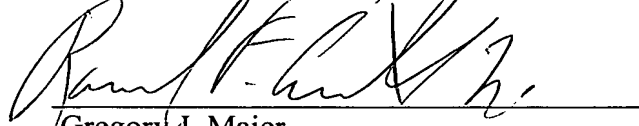
Accordingly, as Okada fails to disclose or suggest the features of independent Claims 1, 63, and 67, it is respectfully requested that the outstanding rejection of Claims 1-17, 63, and 67 be withdrawn.

Likewise, with respect to the remaining rejections of Claims 8 and 14-17, these rejections all primarily rely upon Okada. Because these claims depend from Claim 1, it is respectfully submitted that the outstanding Office Action has not provided a *prima facie* case of obviousness with respect to Claims 8 and 14-17. It is therefore respectfully requested that these rejections be withdrawn.

Consequently, in view of the foregoing discussion, it is respectfully submitted that this application is in condition for allowance. Early and favorable action is therefore respectfully requested.

Respectfully submitted,

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